CLAIMS

1. Incident image displaying device for displaying at least one incident image against a scene image of a scene, the incident image displaying device comprising:

at least one light guide;

at least one input beam transforming element incorporated with a respective one of said at least one light guide, said at least one input beam transforming element receiving incident light beams respective of said at least one incident image from a respective one of at least one image source;

at least one output beam transforming element incorporated with said respective at least one light guide and associated with a respective one of said at least one input beam transforming element; and

a scene-image reflector located behind said at least one light guide, said scene-image reflector reflecting said scene image through at least a portion of said at least one light guide and of said at least one output beam transforming element,

wherein said at least one input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective at least one input beam transforming element,

wherein said at least one output beam transforming element receives from said respective at least one light guide and decouples as decoupled light beams, said set of coupled light beams, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

2. Incident image displaying device for displaying at least one incident image, the incident image displaying device comprising:

at least one light guide;

at least one input beam transforming element incorporated with a respective one of said at least one light guide, said at least one input beam transforming element receiving incident light beams respective of said at least one incident image from a respective one of at least one image source;

at least one output beam transforming element incorporated with a respective one of said at least one light guide and associated with a respective one of said at least one input beam transforming element; and

an opaque shield located behind said at least one light guide, said opaque shield having a substantially dark hue,

wherein said at least one input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective at least one input beam transforming element,

wherein said at least one output beam transforming element receives from said respective at least one light guide and decouples as decoupled light beams, said set of coupled light beams, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

3. Incident image displaying device for displaying at least one incident image, the incident image displaying device comprising:

at least one light guide;

at least one input beam transforming element incorporated with a respective one of said at least one light guide, said at least one input beam transforming element receiving incident light beams respective of said at least one incident image from a respective one of at least one image source;

a plurality of output beam transforming elements incorporated with said respective at least one light guide; and

at least one intermediate beam transforming element for each of said output beam transforming elements, said at least one intermediate beam transforming element being incorporated with a respective one of said at least one light guide, and associated with a respective one of said at least one input beam transforming element;

wherein said at least one input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective at least one input beam transforming element,

wherein said at least one intermediate beam transforming element spatially transforms said set of coupled light beams into a set of coupled light beams,

wherein each of said output beam transforming elements receives from said respective at least one light guide and decouples as decoupled light beams, a set of coupled light beams spatially transformed by said at least one intermediate beam transforming element, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

4. Incident image displaying device for displaying at least one incident image, the incident image displaying device comprising:

at least one light guide;

a plurality of input beam transforming elements incorporated with a respective one of said at least one light guide, a respective one of said input beam transforming elements receiving incident light beams respective of said at least one incident image from a respective one of at least one image source;

a plurality of intermediate beam transforming elements being incorporated with said respective at least one light guide, and associated with said respective input beam transforming element; and

an output beam transforming element incorporated with said respective at least one light guide, and associated with said intermediate beam transforming elements;

wherein said respective input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective input beam transforming element,

wherein each of said intermediate beam transforming elements spatially transforms said set of coupled light beams into a set of coupled light beams,

wherein said output beam transforming element receives from said respective at least one light guide and decouples as decoupled light beams, a set of coupled light beams spatially transformed by said intermediate beam transforming elements, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

5. Incident image displaying device for displaying at least one incident image against a scene image of a scene, the incident image displaying device comprising:

at least one light guide;

at least one input beam transforming element incorporated with a respective one of said at least one light guide, said at least one input beam transforming element receiving incident light beams respective of said at least one incident image from a respective one of at least one image source; and

at least one output beam transforming element incorporated with said respective at least one light guide and associated with a respective one of said at least one input beam transforming element,

wherein said at least one input beam transforming element includes a first input beam transforming element and a second input beam transforming element,

wherein said at least one output beam transforming element includes a first output beam transforming element and a second output beam transforming element,

wherein said first input beam transforming element and said first output beam transforming element are incorporated with a first light guide of said at least one light guide, thereby forming a first displaying module,

wherein said second input beam transforming element and said second output beam transforming element are incorporated with a second light guide of said at least one light guide, thereby forming a second displaying module,

wherein said second input beam transforming element is located below said first input beam transforming element,

wherein said first output beam transforming element is located on one side of said first input beam transforming element and said second input beam transforming element,

wherein said second output beam transforming element is located on the other side of said first input beam transforming element and said second input beam transforming element,

wherein said first input beam transforming element transmits said incident light beams to said second input beam transforming element,

wherein said at least one input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective at least one input beam transforming element,

wherein said at least one output beam transforming element receives from said respective at least one light guide and decouples as decoupled light beams, said set of coupled light beams, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

6. The incident image displaying device according to any of claims 1, 2, 3, 4 or 5, wherein an output angle of said decoupled light beams, is substantially equal to an incidence angle of a respective one of said incident light beams.

7. The incident image displaying device according to claim 1, wherein an output angle of said decoupled light beams, is substantially equal to a reflected scene-image angle of a reflected scene-image light beam, reflected by said scene-image reflector, through at least a portion of said at least one light guide and of said at least one output beam transforming element.

8. The incident image displaying device according to any of claims 1, 2, or 5, wherein said at least one input beam transforming element and said at least one output beam transforming element are incorporated with said at least one light guide, by soft nanolithography.

9. The incident image displaying device according to claim 3, wherein said at least one input beam transforming element and each of said output beam transforming elements are incorporated with said at least one light guide, by soft nanolithography.

10. The incident image displaying device according to claim 4, wherein said output beam transforming element and each of said input beam transforming elements are incorporated with said at least one light guide, by soft nanolithography.

11. The incident image displaying device according to any of claims 1, 2, or 5, wherein the contour of a respective one of said at least one output beam

transforming element, is such that said respective at least one output beam transforming element, collects those portions of said set of coupled light beams, which said respective at least one input beam transforming element couples into said respective at least one light guide toward said respective at least one output beam transforming element, in directions different from a central axis between said respective at least one input beam transforming element and said respective at least one output beam transforming element.

12. The incident image displaying device according to claim 11, wherein said contour is selected from the list consisting of:

rectangle;

square;

trapezoid; and

ellipse.

13. The incident image displaying device according to claim 3, wherein the contour of a respective one of said output beam transforming elements, is such that said respective output beam transforming element, collects those portions of said set of coupled light beams, which said respective at least one input beam transforming element couples into said respective at least one light guide toward said respective output beam transforming element, in directions different from a central axis between said respective at least one input beam transforming element and said respective output beam transforming element.

14. The incident image displaying device according to claim 4, wherein the contour of said output beam transforming element, is such that said output beam transforming element collects those portions of said set of coupled light beams, which said respective input beam transforming element couples into said respective at least one light guide toward said output beam transforming element, in directions different from a central axis

between said respective input beam transforming element and said output beam transforming element.

15. The incident image displaying device according to claim 1, further comprising at least one intermediate beam transforming element incorporated with said respective at least one light guide,

wherein said at least one intermediate beam transforming element is associated with said respective at least one input beam transforming element, and with a respective one of said at least one output beam transforming element,

wherein each of a respective one of said at least one intermediate beam transforming element receives a set of coupled light beams associated with said respective at least one intermediate beam transforming element and with said respective at least one input beam transforming element, and

wherein said respective at least one intermediate beam transforming element spatially transforms said set of coupled light beams into said respective at least one light guide, as another set of coupled light beams.

16. The incident image displaying device according to claim 15, wherein at least one of said at least one input beam transforming element, at least one of said at least one intermediate beam transforming element, and at least one of said at least one output beam transforming element, are located on the same side of two substantially parallel sides of said respective at least one light guide

17. The incident image displaying device according to claim 15, wherein the location of at least one of said at least one input beam transforming element, at least one of said at least one intermediate beam transforming element, and at least one of said at least one output beam transforming element, relative to said respective at least one light guide, is selected from the list consisting of:

within said respective at least one light guide; and

on at least one of two substantially parallel surfaces of said respective at least one light guide.

18. The incident image displaying device according to claim 15, wherein the contour of said respective at least one intermediate beam transforming element, is such that said respective at least one intermediate beam transforming element collects those portions of said set of coupled light beams, which said respective at least one input beam transforming element couples into said respective at least one light guide toward said respective at least one intermediate beam transforming element, in directions different from a central axis between said respective at least one input beam transforming element and said respective at least one intermediate beam transforming element.

19. The incident image displaying device according to claim 18, wherein said contour is selected from the list consisting of:

rectangle;

square;

trapezoid; and

ellipse.

20. The incident image displaying device according to claim 15, wherein an intermediate microgroove direction of a respective one of said at least one intermediate beam transforming element, relative to an input microgroove direction of said respective at least one input beam transforming element, and relative to an output microgroove direction of a respective one of said at least one output beam transforming element, is such that said respective at least one intermediate beam transforming element receives said set of coupled light beams from said respective at least one input beam transforming element, and such that said respective at least one output beam transforming element receives said set of coupled light beams, spatially transformed by said respective at least one intermediate beam transforming element.

21. The incident image displaying device according to claim 15, wherein each of said at least one input beam transforming element, said at least one intermediate beam transforming element and said at least one output beam transforming element, is selected from the list consisting of:
    refraction light beam transformer; and
    diffraction light beam transformer.

22. The incident image displaying device according to claim 21, wherein said refraction light beam transformer is selected from the list consisting of:
    prism;
    Fresnel lens;
    micro-prism array;
    gradient index lens; and
    gradient index micro-lens array.

23. The incident image displaying device according to claim 21, wherein said diffraction light beam transformer is a diffraction optical element.

24. The incident image displaying device according to any of claims 1, 2, 3, or 5, wherein said respective at least one input beam transforming element receives said incident light beams from at least one side of said incident image displaying device.

25. The incident image displaying device according to claim 4, wherein said respective input beam transforming element receives said incident light beams from at least one side of said incident image displaying device.

26. The incident image displaying device according to claim 1, wherein said scene-image reflector is selected from the list consisting of:
    back-coated mirror;
    dielectric film;
    interference coating;

rugate coating;

reflective beam transforming element;

metallic film;

metallic coating; and

variable reflector.

27. The incident image displaying device according to any of claims 1, 2, 3, or 5, further comprising at least one projected-image reflector located adjacent to said respective at least one input beam transforming element,

wherein said at least one projected-image reflector directs said incident light beams from said respective at least one image source toward said respective at least one input beam transforming element.

28. The incident image displaying device according to claim 4, further comprising at least one projected-image reflector located adjacent to said respective input beam transforming element,

wherein said at least one projected-image reflector directs said incident light beams from said respective at least one image source toward said respective input beam transforming element.

29. The incident image displaying device according to any of claims 1, 2, 3, or 5, further comprising at least one optical assembly located between said respective at least one image source and said respective at least one input beam transforming element,

wherein said respective at least one optical assembly directs said incident light beams from said respective at least one image source toward said respective at least one input beam transforming element, at a selected incidence angle.

30. The incident image displaying device according to claim 29, wherein said at least one optical assembly comprises:

an image focal-point location changer; and

a controller coupled with said image focal-point location changer,

wherein said controller directs said image focal-point location changer, to vary at least one projected-image focal length of a respective one of said at least one incident image.

31. The incident image displaying device according to claim 30, wherein said image focal-point location changer is selected from the list consisting of:

variable focal-length lens; and

moving lens.

32. The incident image displaying device according to claim 30, wherein said controller directs said image focal-point location changer to vary said at least one projected-image focal length, in an oscillating manner.

33. The incident image displaying device according to claim 4, further comprising at least one optical assembly located between said respective at least one image source and said respective input beam transforming element,

wherein said respective at least one optical assembly directs said incident light beams from said respective at least one image source toward said respective input beam transforming element, at a selected incidence angle.

34. The incident image displaying device according to any of claims 1, 2, 3, or 5, further comprising at least one input-element light reflector, said respective at least one input beam transforming element being located between a respective one of said at least one image source and said respective at least one input-element light reflector,

wherein said respective at least one input-element light reflector recycles at least a portion of said incident light beams from said respective at least one input beam transforming element into said respective at least one light guide.

35. The incident image displaying device according to claim 4, further comprising at least one input-element light reflector, said respective input beam transforming element being located between a respective one of said at least one image source and said respective at least one input-element light reflector,

wherein said respective at least one input-element light reflector recycles at least a portion of said incident light beams from said respective input beam transforming element into said respective at least one light guide.

36. The incident image displaying device according to any of claims 1, 2, 3, or 5, further comprising at least one beam splitter located adjacent to said at least one input beam transforming element,

wherein said at least one beam splitter directs a first incident light beam received from one of said at least one image source and a second incident light beam received from another one of said at least one image source, toward said respective at least one input beam transforming element.

37. The incident image displaying device according to claim 4, further comprising at least one beam splitter located adjacent to respective input beam transforming element,

wherein said at least one beam splitter directs a first incident light beam received from one of said at least one image source and a second incident light beam received from another one of said at least one image source, toward said respective input beam transforming element.

38. The incident image displaying device according to any of claims 1, 2, 3, or 5, further comprising at least one image projector associated with said at least one image source,

wherein said at least one image source sends information respective of said at least one incident image, to said at least one image projector, and

wherein said at least one image projector projects said incident light beams toward said respective at least one input beam transforming element.

39. The incident image displaying device according to claim 4, further comprising at least one image projector associated with said at least one image source,

wherein said at least one image source sends information respective of said at least one incident image, to said at least one image projector, and

wherein said at least one image projector projects said incident light beams toward said respective input beam transforming element.

40. The incident image displaying device according to any of claims 1, 2, 3, 4, or 5, wherein said at least one image source is selected from the list consisting of:

light emitting diode;
laser;
laser scanner;
fluorescent light element;
incandescent light element;
liquid crystal display;
cathode ray tube display;
flat panel display;
still image projector;
cinematographic image projector;
starlight scope; and
spatial light modulator.

41. The incident image displaying device according to claim 1, wherein a projected-image focal length respective of each output decoupled image of said set of output decoupled images, relative to at least one eye of an

observer, is substantially equal to a scene-image focal length of said scene image, relative to said at least one eye.

42. The incident image displaying device according to any of claims 1, 2, or 5, wherein an input microgroove direction of said respective at least one input beam transforming element, relative to an output microgroove direction of a respective one of said at least one output beam transforming element, is such that said respective at least one output beam transforming element receives said set of coupled light beams, from said respective at least one input beam transforming element.

43. The incident image displaying device according to claim 3, wherein an input microgroove direction of said respective at least one input beam transforming element, relative to an output microgroove direction of a respective one of said output beam transforming elements, is such that said respective output beam transforming element receives said set of coupled light beams, from said respective at least one input beam transforming element.

44. The incident image displaying device according to claim 4, wherein an input microgroove direction of said respective input beam transforming element, relative to an output microgroove direction of said output beam transforming element, is such that said output beam transforming element receives said set of coupled light beams, from said respective input beam transforming element.

45. The incident image displaying device according to any of claims 1, 2, or 5, wherein an output microgroove direction of a respective one of said at least one output beam transforming element, is such that said decoupled light beams are decoupled out of said respective at least one light guide.

46. The incident image displaying device according to claim 3, wherein an output microgroove direction of a respective one of said output beam

transforming elements, is such that said decoupled light beams are decoupled out of said respective at least one light guide.

47. The incident image displaying device according to claim 4, wherein an output microgroove direction of said output beam transforming element, is such that said decoupled light beams are decoupled out of said respective at least one light guide.

48. The incident image displaying device according to any of claims 1, 2, 3, 4, or 5, wherein each output decoupled image of said set of output decoupled images, is selected from the list consisting of:

biocular;

split biocular;

binocular; and

stereoscopic.

49. The incident image displaying device according to any of claims 1, 2, or 5, wherein a local diffraction efficiency of said at least one output beam transforming element, increases from two edges thereof toward a midsection thereof.

50. The incident image displaying device according to claim 3, wherein a local diffraction efficiency of each of said output beam transforming element, increases from two edges thereof toward a midsection thereof.

51. The incident image displaying device according to claim 4, wherein a local diffraction efficiency of said output beam transforming element, increases from two edges thereof toward a midsection thereof.

52. The incident image displaying device according to any of claims 1, or 2, wherein said at least one input beam transforming element includes a first input beam transforming element and a second input beam transforming element,

wherein said at least one output beam transforming element includes a first output beam transforming element and a second output beam transforming element,

wherein said first input beam transforming element and said first output beam transforming element are incorporated with a first light guide of said at least one light guide, thereby forming a first displaying module,

wherein said second input beam transforming element and said second output beam transforming element are incorporated with a second light guide of said at least one light guide, thereby forming a second displaying module,

wherein said second input beam transforming element is located below said first input beam transforming element,

wherein said first output beam transforming element is located on one side of said first input beam transforming element and said second input beam transforming element,

wherein said second output beam transforming element is located on the other side of said first input beam transforming element and said second input beam transforming element, and

wherein said first input beam transforming element transmits said incident light beams to said second input beam transforming element.

53. The incident image displaying device according to claim 52, wherein said first displaying module includes a first set of at least two displaying modules located on the top of one another,

wherein said second displaying module includes a second set of at least two displaying modules located on the top of one another,

wherein each displaying module of said first set is associated with a selected input field of view respective of said respective at least one incident image, and each displaying module of said second set is associated with a selected input field of view respective of said respective at least one incident image,

wherein an output field of view respective of each output decoupled image of said set of output decoupled images, respective of said first

displaying module is substantially equal to the sum of said selected input field of views, and

wherein an output field of view respective of each output decoupled image of said set of output decoupled images, respective of said second displaying module is substantially equal to the sum of said selected input field of views.

54. The incident image displaying device according to claim 52, wherein said first displaying module includes a first set of displaying modules located on the top of one another,

wherein said second displaying module includes a second set of displaying modules located on the top of one another,

wherein each displaying module of said first set is associated with a selected range of wavelengths, and each displaying module of said second set is associated with a selected range of wavelengths,

wherein each output decoupled image of said set of output decoupled images, respective of said first displaying module includes said selected ranges of wavelengths, and

wherein each output decoupled image of said set of output decoupled images, respective of said second displaying module includes said selected ranges of wavelengths.

55. The incident image displaying device according to any of claims 1, 2, or 5, further comprising an image expander located between a selected one of said at least one input beam transforming element and said respective at least one image source, said image expander emitting a set of expanded light beams by expanding said incident light beams in an expansion axis substantially perpendicular to a coupling axis along which said at least one output beam transforming element receives said set of coupled light beams, said image expander transmitting said set of expanded light beams to said selected input beam transforming element.

56. The incident image displaying device according to claim 55, wherein said image expander comprises:

a light guide; and

an input beam transforming element incorporated with said light guide, said input beam transforming element receiving said incident light beams, said input beam transforming element producing said set of expanded light beams, by coupling said incident light beams into said light guide as a set of coupled light beams, and decoupling said set of coupled light beams.

57. The incident image displaying device according to claim 55, wherein said image expander comprises:

a housing; and

a plurality of reflective elements located within said housing along said expansion axis, said reflective elements producing said set of expanded light beams, by receiving said incident light beams from a previous reflective element, and by further reflecting said incident light beams.

58. The incident image displaying device according to claim 57, further comprising a moving mechanism coupled with said image expander, said moving mechanism moving said image expander in an oscillating manner along said expansion axis.

59. The incident image displaying device according to claim 57, further comprising a reflector for reflecting said incident light beams toward said reflective elements.

60. The incident image displaying device according to claim 59, further comprising a moving mechanism coupled with said reflector, wherein said moving mechanism moves said reflector in an oscillating manner, along an incident axis at which said reflector receives said incident light beams from said respective image source.

61. The incident image displaying device according to claim 55, wherein said image expander is in form of a reflective element, said incident image displaying device further comprising a moving element coupled with said reflective element, said moving element moving said reflective element in an oscillating manner along said expansion axis, said image expander producing said set of expanded light beams via the oscillating action of said reflective element.

62. The incident image displaying device according to claim 55, wherein said image expander is in form of a reflective element, said incident image displaying device further comprises:

a reflector for reflecting said incident light beams toward said reflective element; and

a moving mechanism coupled with said reflector, said moving mechanism moving said reflector in an oscillating manner along an incident axis at which said reflector receives said incident light beams from said respective image source, said image expander producing said set of expanded light beams via the oscillating action of said reflector.

63. The incident image displaying device according to claim 2, further comprising at least one intermediate beam transforming element incorporated with said respective at least one light guide,

wherein said at least one intermediate beam transforming element is associated with said respective at least one input beam transforming element, and with a respective one of said at least one output beam transforming element,

wherein each of a respective one of said at least one intermediate beam transforming element receives a set of coupled light beams associated with said respective at least one intermediate beam transforming element and with said respective at least one input beam transforming element, and

wherein said respective at least one intermediate beam transforming element spatially transforms said set of coupled light beams into said respective at least one light guide, as another set of coupled light beams.

64. The incident image displaying device according to claim 3, further comprising an opaque shield located behind said at least one light guide, said opaque shield having a substantially dark hue.

65. The incident image displaying device according to claim 1, wherein said scene-image reflector is a variable reflector.

66. The incident image displaying device according to claim 5, further comprising a variable transmitter located in front of said at least one light guide,

wherein said variable transmitter varies the intensity of scene-image light beams respective of said scene.

67. The incident image displaying device according to any of claims 2, 3, or 4, further comprising a variable transmitter located in front of said at least one light guide,

wherein said variable transmitter varies the intensity of scene-image light beams respective of a scene located behind said at least one light guide.

68. The incident image displaying device according to any of claims 3, 4, or 5, wherein a projected-image focal length respective of each output decoupled image of said set of output decoupled images, relative to at least one eye of an observer, is substantially equal to a scene-image focal length of a scene image of a scene, relative to said at least one eye, said scene being located behind said at least one light guide.

69. The incident image displaying device according to claim 3, wherein a first output beam transforming element of said output beam transforming

elements, is located between an intermediate beam transforming element of said at least one intermediate beam transforming element, and a second output beam transforming element of said output beam transforming elements.

70. The incident image displaying device according to claim 1, wherein every set of said at least one input beam transforming element, said at least one intermediate beam transforming element, and said at least one output beam transforming element, is incorporated with a different one of at least two light guides, thereby forming a set of at least two displaying modules,

wherein each displaying module of said set of at least two displaying modules is located on the top of another displaying module of said set of at least two displaying modules, and

wherein each of said at least one output beam transforming element at least partially overlaps another one of said at least one output beam transforming element, and

wherein each of said at least one input beam transforming element transmits said incident light beams to another one of said at least one input beam transforming element.

71. The incident image displaying device according to claim 70, wherein each of said displaying module and said other displaying module is associated with a selected input field of view respective of said respective at least one incident projected image, and

wherein an output field of view respective of each output decoupled image of said set of output decoupled images, is substantially equal to the sum of said selected input field of views.

72. The incident image displaying device according to claim 70, wherein each of said displaying module and said other displaying module is associated with a selected range of wavelengths, and

wherein each output decoupled image of said set of output decoupled images, includes said selected ranges of wavelengths.

73. The incident image displaying device according to claim 5, wherein said first displaying module includes a first set of at least two displaying modules located on the top of one another,

wherein said second displaying module includes a second set of at least two displaying modules located on the top of one another,

wherein each displaying module of said first set is associated with a selected input field of view respective of said respective at least one incident image, and each displaying module of said second set is associated with a selected input field of view respective of said respective at least one incident image,

wherein an output field of view respective of each output decoupled image of said set of output decoupled images, respective of said first displaying module is substantially equal to the sum of said selected input field of views, and

wherein an output field of view respective of each output decoupled image of said set of output decoupled images, respective of said second displaying module is substantially equal to the sum of said selected input field of views.

74. The incident image displaying device according to claim 5, wherein said first displaying module includes a first set of displaying modules located on the top of one another,

wherein said second displaying module includes a second set of displaying modules located on the top of one another,

wherein each displaying module of said first set is associated with a selected range of wavelengths, and each displaying module of said second set is associated with a selected range of wavelengths,

wherein each output decoupled image of said set of output decoupled images, respective of said first displaying module includes said selected ranges of wavelengths, and

wherein each output decoupled image of said set of output decoupled images, respective of said second displaying module includes said selected ranges of wavelengths.

75. Method for displaying at least one incident image against a reflected scene image of a scene, the method comprising the procedures of:

coupling a set of light beams respective of said at least one incident image, into a respective one of at least one light guide, thereby forming at least one set of coupled light beams;

decoupling a set of coupled light beams out of said respective at least one light guide, as decoupled light beams, thereby forming a set of output decoupled images, each output decoupled image of said set of output decoupled images, being respective of a sensor fused image and a pupil expanded representation of said at least one incident image; and

reflecting a scene image of said scene, through at least a portion of said respective at least one light guide and at least one output beam transforming element.

76. Method for displaying at least one incident image, the method comprising the procedures of:

coupling a set of light beams respective of said at least one incident image, into a respective one of at least one light guide, as sets of coupled light beams;

spatially transforming said sets of coupled light beams, by a plurality of intermediate beam transforming elements; and

decoupling a set of coupled light beams out of said respective at least one light guide, as decoupled light beams, by at least one output beam transforming element, thereby forming a set of output decoupled images, each output decoupled image of said set of output decoupled images, being respective of a sensor fused image and a pupil expanded representation of said at least one incident image.

77. The method according to claim 75, further comprising a preliminary procedure of projecting said set of light beams, toward a respective one of at least one input beam transforming element.

78. The method according to claim 76, further comprising a preliminary procedure of projecting said set of light beams, toward a respective one of at least one input beam transforming element.

79. The method according to any of claims 77 or 78, wherein said procedure of projecting is performed by at least one image source.

80. The method according to any of claims 77 or 78, wherein said procedure of projecting is performed by at least one image projector.

81. The method according to any of claims 77 or 78, further comprising a preliminary procedure of sending information respective of at least one incident image, by at least one image source, toward at least one image projector.

82. The method according to any of claims 77 or 78, wherein said procedure of projecting includes a sub-procedure of directing said set of light beams from at least one image source, toward said respective at least one input beam transforming element, by an optical assembly.

83. The method according to claim 77, wherein said procedure of projecting includes a sub-procedure of directing said set of light beams, by a projected-image reflector, toward said respective at least one input beam transforming element, at an incidence angle which is substantially equal to another incidence angle of said scene on said respective light guide.

84. The method according to any of claims 77 or 78, wherein said procedure of projecting includes a sub-procedure of directing said set of light beams,

toward said respective at least one input beam transforming element, from at least one side of said at least one light guide.

85. The method according to any of claims 77 or 78, wherein said procedure of projecting includes a sub-procedure of changing the location of a focal plane of said output decoupled image, relative to the eyes of an observer.

86. The method according to any of claims 77 or 78, further comprising a preliminary procedure of receiving said set of light beams, by a beam splitter, from two image sources.

87. The method according to any of claims 75 or 76, further comprising a preliminary procedure of recycling a portion of said set of light beams into said respective at least one light guide, by an input-element light reflector.

88. The method according to any of claims 75 or 76, wherein said procedure of coupling is performed by internal reflection within said respective at least one light guide.

89. The method according to claim 88, wherein the mode of said internal reflection is selected from the list consisting of:

total; and

partial.

90. The method according to any of claims 75 or 76, wherein said procedure of coupling is performed by two beam transforming elements, toward a beam transforming element located between said two beam transforming elements, in substantially opposite directions relative to said beam transforming element.

91. The method according to any of claims 75 or 76, wherein said set of light beams are coupled into said respective at least one light guide in a mode selected from the list consisting of:

transmissive; and

reflective.

92. The method according to any of claims 75 or 76, wherein said procedure of coupling includes a sub-procedure of transmitting said set of light beams by a first beam transforming element to a second beam transforming element.

93. The method according to any of claims 75 or 76, wherein said procedure of decoupling is performed at an output angle substantially equal to an incidence angle respective of said set of light beams.

94. The method according to any of claims 75 or 76, wherein said procedure of decoupling is performed at an output field of view, substantially equal to the sum of at least two selected input field of views, wherein each of said at least two selected field of views is respective of a different one of at least two beam transforming elements.

95. The method according to any of claims 75 or 76, wherein said procedure of decoupling is performed at a range of wavelengths substantially equal to the sum of at least two selected ranges of wavelengths, wherein each of said at least two selected ranges of wavelengths is respective of a different one of at least two beam transforming elements.

96. The method according to claim 75, wherein said procedure of reflecting includes a sub-procedure of varying the intensity of light beams respective of said reflected scene image.

97. The method according to claim 75, further comprising a procedure of spatially transforming said at least one set of coupled light beams, within said respective at least one light guide.

98. The method according to any of claims 75 or 76, further comprising a procedure of collecting those portions of said at least one set of coupled light beams, which are coupled into said respective at least one light guide, in directions different than a central axis between two beam transforming elements, after performing said procedure of coupling.

99. The method according to any of claims 75 or 76, further comprising the preliminary procedures of:

receiving said set of light beams by an image expander;

expanding said set of light beams in an expansion axis substantially perpendicular to a coupling axis along which said set of light beams are coupled into said respective light guide; and

transmitting said expanded set of light beams to said respective light guide.

100. The method according to claim 99, further comprising a procedure of oscillating said image expander along said expansion axis.

101. The method according to claim 76, further comprising a procedure of providing a substantially dark background against said at least one light guide.

102. The method according to claim 76, further comprising a procedure of transmitting scene-image light beams respective of a scene, through at least a portion of said at least one light guide and said at least one output beam transforming element.

103. The method according to claim 102, wherein said procedure of transmitting includes a sub-procedure of varying the intensity of said scene-image light beams.

104. Apparatus for viewing a set of output decoupled images against a scene image of a scene, the apparatus comprising:

an optical assembly; and

an incident image displaying device comprising:

at least one light guide;

at least one input beam transforming element incorporated with a respective one of said at least one light guide, said at least one input beam transforming element receiving incident light beams respective of said at least one incident image from a respective one of at least one image source;

at least one output beam transforming element incorporated with said respective at least one light guide and associated with a respective one of said at least one input beam transforming element; and

a scene-image reflector located behind said at least one light guide, said scene-image reflector reflecting said scene image through at least a portion of said at least one light guide and of said at least one output beam transforming element,

wherein said at least one input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective at least one input beam transforming element,

wherein said at least one output beam transforming element receives from said respective at least one light guide and decouples as decoupled light beams, said set of coupled light beams, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

105. Apparatus for viewing a set of output decoupled images, the apparatus comprising:

an optical assembly; and

an incident image displaying device comprising:

at least one light guide;

at least one input beam transforming element incorporated with a respective one of said at least one light guide, said at least one input beam transforming element receiving incident light beams respective of said at least one incident image from a respective one of at least one image source;

at least one output beam transforming element incorporated with a respective one of said at least one light guide and associated with a respective one of said at least one input beam transforming element; and

an opaque shield located behind said at least one light guide, said opaque shield having a substantially dark hue,

wherein said at least one input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective at least one input beam transforming element,

wherein said at least one output beam transforming element receives from said respective at least one light guide and decouples as decoupled light beams, said set of coupled light beams, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

106. Apparatus for viewing a set of output decoupled images, the apparatus comprising:

an optical assembly; and

an incident image displaying device comprising:

at least one light guide;

at least one input beam transforming element incorporated with a respective one of said at least one light guide, said at least one input beam transforming element receiving incident light beams respective of said at least one incident image from a respective one of at least one image source;

a plurality of output beam transforming elements incorporated with said respective at least one light guide; and

at least one intermediate beam transforming element for each of said output beam transforming elements, said at least one intermediate beam transforming element being incorporated with a respective one of said at least one light guide, and associated with a respective one of said at least one input beam transforming element;

wherein said at least one input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective at least one input beam transforming element,

wherein said at least one intermediate beam transforming element spatially transforms said set of coupled light beams into a set of coupled light beams,

wherein each of said output beam transforming elements receives from said respective at least one light guide and decouples as decoupled light beams, a set of coupled light beams spatially transformed by said at least one intermediate beam transforming element, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

107. Apparatus for viewing a set of output decoupled images, the apparatus comprising:

an optical assembly; and

an incident image displaying device comprising:

at least one light guide;

a plurality of input beam transforming elements incorporated with a respective one of said at least one light guide, a respective one of said input beam transforming elements receiving incident light beams respective of said at least one incident image from a respective one of at least one image source;

a plurality of intermediate beam transforming elements being incorporated with said respective at least one light guide, and associated with said respective input beam transforming element; and

an output beam transforming element incorporated with said respective at least one light guide, and associated with said intermediate beam transforming elements;

wherein said respective input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective input beam transforming element,

wherein each of said intermediate beam transforming elements spatially transforms said set of coupled light beams into a set of coupled light beams,

wherein said output beam transforming element receives from said respective at least one light guide and decouples as decoupled light beams, a set of coupled light beams spatially transformed by said intermediate beam transforming elements, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

108. Apparatus for viewing a set of output decoupled images, the apparatus comprising:

an optical assembly; and

an incident image displaying device comprising:

at least one light guide;

at least one input beam transforming element incorporated with a respective one of said at least one light guide, said at least one input beam transforming element receiving incident light beams respective of said at least one incident image from a respective one of at least one image source; and

at least one output beam transforming element incorporated with said respective at least one light guide and associated with a respective one of said at least one input beam transforming element,

wherein said at least one input beam transforming element includes a first input beam transforming element and a second input beam transforming element,

wherein said at least one output beam transforming element includes a first output beam transforming element and a second output beam transforming element,

wherein said first input beam transforming element and said first output beam transforming element are incorporated with a first light guide of said at least one light guide, thereby forming a first displaying module,

wherein said second input beam transforming element and said second output beam transforming element are incorporated with a second light guide of said at least one light guide, thereby forming a second displaying module,

wherein said second input beam transforming element is located below said first input beam transforming element,

wherein said first output beam transforming element is located on one side of said first input beam transforming element and said second input beam transforming element,

wherein said second output beam transforming element is located on the other side of said first input beam transforming element and said second input beam transforming element,

wherein said first input beam transforming element transmits said incident light beams to said second input beam transforming element,

wherein said at least one input beam transforming element couples said incident light beams into said respective at least one light guide as a set of coupled light beams, said set of coupled light beams is associated with said respective at least one input beam transforming element,

wherein said at least one output beam transforming element receives from said respective at least one light guide and decouples as decoupled

light beams, said set of coupled light beams, thereby forming a set of output decoupled images, and

wherein each output decoupled image of said set of output decoupled images is representative of a sensor fused image of said at least one incident image.

109. The apparatus according to any of claims 104, 105, 106, 107, or 108, wherein said optical assembly is selected from the list consisting of:

virtual image projector head-up display;
head mounted display;
virtual image mirror;
virtual image rear-view mirror;
auto-dimming virtual image rear-view mirror;
biocular display;
binocular display;
stereoscopic display;
spectacles display;
wearable display;
diving mask;
ski goggles;
ground vehicle head-up display;
helmet mounted display;
aircraft head-up display;
automotive head-up display;
spacecraft helmet mounted display system;
spacecraft helmet mounted see-through display system;
marine vehicle;
helmet mounted display system;
marine vehicle helmet mounted see-through display system;
virtual display panel for computer applications;
virtual display panel for television monitor applications;
virtual display periscope;
virtual display biocular;

virtual display telescope;
virtual display reflex camera;
virtual display camera viewer;
virtual display view finder;
device for displaying sensor fused images;
virtual display binocular microscope display optics; and
virtual display biocular microscope display optics.

110. Incident image displaying device according to any of claims 1-74 substantially as described hereinabove.

111. Incident image displaying device according to any of claims 1-74 substantially as illustrated in any of the drawings.

112. Method for displaying at least one incident image according to any of claims 75-103 substantially as described hereinabove.

113. Method for displaying at least one incident image according to any of claims 75-103 substantially as illustrated in any of the drawings.

114. Apparatus for viewing a set of output decoupled images, according to any of claims 104-109 substantially as described hereinabove.

115. Apparatus for viewing a set of output decoupled images, according to any of claims 104-109 substantially as illustrated in any of the drawings.